Dissemination and Exploitation and Collaboration plan

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ABSTRACT

Important goals of the OPEN project are the dissemination and exploitation of the research results, as well as the widening of collaboration between companies and universities. The purpose of this document is to give an overview of the main activities the OPEN project consortium has undertaken, and plans to undertake in order to reach these goals. This plan provides a detailed description of the activities we identified to be most important It also outlines the intended exploitation plans of all partners. These plans will be further elaborated in the final plan, D7.5.

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1. INTRODUCTION AIM AND SHAPE OF THE PLAN

The purpose of this document is to give an overview of the main activities the OPEN project consortium has undertaken, and plans to undertake in the areas of dissemination, exploitation and collaboration. The plan gives details on activities we have identified to be important, and outlines the intended exploitation plans of all partners.

The report and plan are updated annually in order to track the progress of the activities, to provide updates of the plan and to give more detailed plans approaching the end of the OPEN project. The document is structured in three main parts, i.e. sections on the dissemination plan, the collaboration plan and the exploitation plan. It begins with an overview of the main goal of the project, which is to produce a platform and methods enabling migratory applications.

1.1. MIGRATORY APPLICATIONS

One important aspect of ubiquitous environments is to provide users with the possibility to freely move about and continue to interact with the available applications through a variety of interactive devices such as cell phones, PDAs, desktop computers, digital television sets or intelligent watches. In such environments one potential source of significant frustration is that people have to start their application session over again from the beginning after changing to a different interactive device.

Migratory applications can overcome this limitation. Migratory applications, as defined by OPEN, are applications which are able to follow users, sense the users' context (where context is any information that can be used to characterize the situation of an entity [Dey00]), and adapt to the changing context, e.g., set of available devices, while also preserving the continuity of application sessions, thereby ensuring the continuity of the tasks supported by the application.

To summarize:

Migration is a combination of

- Device Change
- Adaptation
- Continuity

As we will describe in the following sections, in order to have a real 'migration', all such aspects have to be included: no proper 'migration' occurs if there is a change of device and an adaptation of the application features to the new device, but there is no continuity in the resulting user activity because, for instance, the user has to restart from the beginning when the new configuration is activated. Likewise, a situation in which there has been a device change, and the state of the application has also been preserved, cannot be properly called 'migration', if adaptation is called for, but is not performed.

Therefore, migration encompasses all three aspects and the related issues:

- device change: how devices are discovered and selected;
- adaptation: how the characteristics of the context are taken into account and handled when adapting the application to the characteristics of the new context;
- continuity: how to guarantee continuity in task performance, and associated issues like the necessity of techniques for preserving the state.

Thus, the OPEN project provides integrated solutions able to address all three aspects: device change, task continuity and adaptation. This is obtained through the Migration Service Platform (MSP), a middleware for migratory applications. With a migratory application, users can change which interactive devices and which networks are used to interact with the application, can have the interaction adapted to the form and features of the new set of devices, and can seamlessly continue their work, using their existing sessions with the application.

Migration is made possible by the MSP and the underlying networks, and may also involve reconfiguration, re-wiring, replacement or migration of components of the application logic. Figure 1 presents a high-level view of the intent of the OPEN Migration Service Platform, which is to enable software developers to turn an application into a migratory application.

Ideally, the migration platform should be able to take all existing applications and make them migratory. However, this is clearly too ambitious for a single project, thus we focus on classes of applications, in particular, Web applications and distributed applications in the game and business domains. In addition, the project looks at the extent to which such applications should be developed according to some guidelines in order to ease the support given by the migration platform.

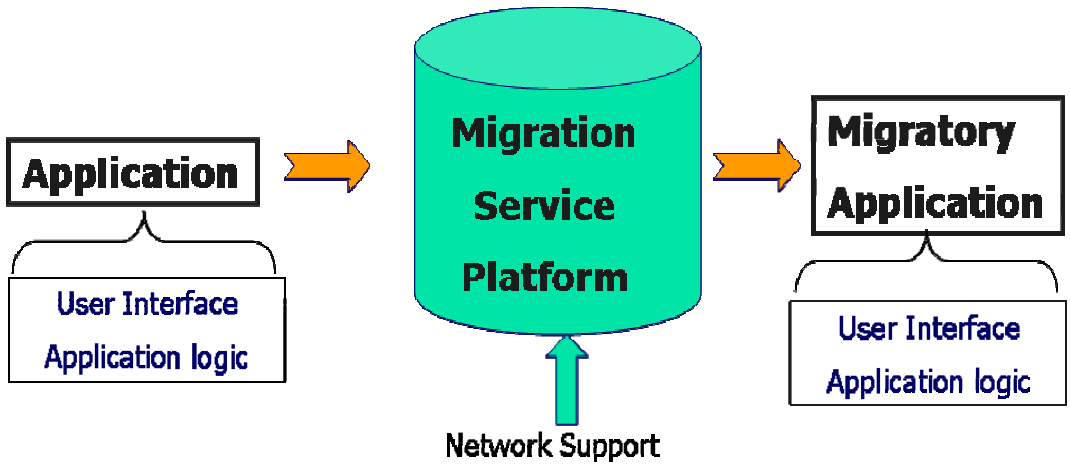

Figure 1 Migratory Application Supported by MSP and Network

1.2. CAPABILITIES OF A MIGRATORY APPLICATION

As indicated in Figure 1 an application consists of two basic types of components of relevance to OPEN: user interface (UI) components and application logic components. Both of these can be migrated and adapted by a migratory application with the aid of the OPEN MSP. In addition, a migratory application can adapt to changes in the availability or quality of the networks in the current environment of the user. Thus, as users move about or as their environment changes, a migratory application can perform three basic types of actions, which can be done singly or together.

- Migration of the user interface: This type of migration allows users to change the interaction device and to continue their current tasks. User interface migration requires the system to capture the state of both the user interface and the application logic in order to send it to the new device to continue interaction. If necessary, the state can be transformed before the transfer. The MSP will also allow for partial migration of a user interface. Partial migration enables users to switch from single device interaction to multiple device interaction or vice versa. UI Migration also involves adaptation of interaction to the form and capabilities of the target device, e.g., a switch to more computationally intensive graphical special effects, if the device has enough cores.

- Application Logic Reconfiguration: This concerns the reconfiguration, and sometimes the migration, of the logical (computational) components of the application. Whenever the new device or new devices provide a new set of features or functions which are not supported by the current devices, a migration and reconfiguration of the application logic may be required. A reconfiguration often requires a change in the set of currently active application components. Some new components might be needed; others might be not needed anymore.

- Network Reconfiguration: Network availability, connectivity and quality can vary from place to place, from device to device, and from time to time. Migratory applications can react to such variation by switching which networks are used by which devices, or by re-configuring how the networks are used by the devices. If the networks support it, migratory applications can also simultaneously switch to a different device and a different network without interruption to their sessions, e.g. audio or video sessions. From the user's point of view, this switch looks like both a network switch and a user interface migration with task continuity.

2. DISSEMINATION PLAN

This section gives an overview of the dissemination strategies of all partners. It reflects dissemination in the scientific community and beyond. Academic partners also look ahead to events in the scientific community which are considered to be opportunities for dissemination as of August 2009. Past dissemination activities for all partners are listed in an Appendix.

2.1. SCIENTIFIC COMMUNITY

OPEN can potentially contribute to several scientific communities. The main means of contribution will be the publication of conference and journal contributions, the organization of events and workshops as well as direct contacts to particular research groups. We start with the dissemination goals of the academic partners: Clausthal University, Aalborg University and CNR-ISTI.

2.1.1. CLAUSTHAL UNIVERSITY

As the main research of Clausthal University is on application logic reconfiguration using context information, various conferences and workshops can be considered. Among others, the following conferences and workshops cover the topic of application logic reconfiguration and the topic of considering context information during reconfiguration. They have already submitted papers successfully to similar conferences, and are convinced that we will address interested researchers. The following table comprises the main future opportunities for scientific publication by Clausthal University.

Future Opportunities	Location and date of event
Pervasive – International Conference on Pervasive Computing	Mannheim, Germany March 2010
Dependable and Adaptive Distributed Systems - 5th DADS Track of the 25th ACM Symposium on Applied Computing (SAC 2010)	Sierre, Switzerland March 2010
International Conference on Software Engineering (ICSE)	Cape Town, South Africa May 2010
International Conference on Self-adaptive and Self-organizing Systems (SASO)	San Francisco, USA September 2009
The Third International ICST Conference on Mobile Wireless Middleware, Operating Systems, and Applications	Chicago, USA June 2010

International Workshop on Middleware for Pervasive Mobile and Embedded Computing	Illinois, USA November 2009
The 4th International Workshop on Middleware Tools, Services and Run-Time Support for Sensor Networks (MidSens'09)	Illinois, USA December 2009

Table 1 Clausthal University: Future Opportunities

In addition to, and on the basis of, the conference and workshop publications, Clausthal University plans to publish a doctoral thesis within the OPEN project. It will basically deal with adapting the component instance wiring during runtime based on context information.

2.1.2. AALBORG UNIVERSITY

Aalborg University has a focus on IP based communication networks, especially regarding performance and dependability aspects. The following table comprises the corresponding future opportunities for scientific publication by Aalborg University.

Future Opportunities	Location and date of opportunity
International Workshop on Middleware for Pervasive Mobile and Embedded Computing	November 2009
IEEE International Symposium on Personal, Indoor and Mobile Radio Communications	September 2010
IEEE GLOBAL COMMUNICATIONS CONFERENCE	December 2010

Table 2: Aalborg University Future Opportunities

On top of these conferences, the following journals are candidate channels for publication by Aalborg University: Performance Evaluation transactions, IEEE transactions on communications, and IEEE transactions on networking.

Beyond regular involvement in teaching activities, such as course lectures and meetings, the special set-up of teaching at Aalborg University creates opportunities for an internal scientific dissemination, which is also linked to industrial cooperation. On the one hand, all graduate students participate in the Aalborg model, i.e. self-determined, team-based learning in projects, which means, OPEN can be a topic of student semester projects – both on the output side (i.e. making the students aware of the problems in OPEN) and on the input side (i.e. the students giving feedback on (new) problems in OPEN when doing their projects). This can be linked to the participation in "Life-long learning", a yearly, and one week long teaching activity for graduates from Aalborg University.

2.1.3. CNR-ISTI

CNR-ISTI mainly contributes to the areas of Human-Computer Interaction and Ubiquitous Systems. The following table comprises the corresponding future opportunities for scientific publication by CNR-ISTI.

Future Opportunities	Location and date of opportunity
Mobile HCI	Bonn, GermanySeptember 2009
3rd European Conference on Ambient Intelligence	Salzburg (Austria) November 2009
Interaccion 2009	Armenia, Columbia September 2009
ACM CHI 2010	Atlanta, USA April 2010
ACM IUI 2010	Hong Kong, China February 2010
EICS 2010	Berlin, Germany July 2010

Table 3 CNR-ISTI Future Opportunities

On top of these conferences, the following journals are candidate channels for publication by CNR-ISTI: Interacting with Computers, ACM Transactions on Computer-Human Interaction, Personal and Ubiquitous Computing.

In addition, dissemination will be carried out also in university courses at University of Pisa and in various organizations at an international level. Dr. Fabio Paternò was invited and gave courses at: HCIM'08 - Human Computer Interaction Meetings (September 2008), organized by CRS4, Cagliari (Italy); Swiss Winter School on "Usability Engineering", (January 2009) Anzere, Switzerland organized by the French speaking Swiss universities; and the course on Ubiquitous Computing (February 2009) organized by the Master on Software Development of the University of Granada.

2.2. INDUSTRIAL GROUPS AND OTHER DISSEMINATION CHANNELS

In order to avoid that the results of the project will be communicated to a limited community, various initiatives will be organized. To this end, we will organize seminars and workshops with industrial projects about related topics (starting with those industrial projects which already

involve the industrial OPEN partners). Wider industrial groups will be reached through seminars presented to other organizations with which we are in contact, and to groups of industrial users. CNR-ISTI will continue to give tutorials at international conferences in the multimodal interfaces and HCI areas presenting the project results. In addition, results will be discussed in university courses.

CNR-ISTI also hosted a meeting of the Ubiquitous Web Applications W3C working group (http://www.w3.org/2007/uwa/) on July 24 and 25. The day before, there was a meeting which decided to start up a Layered User Interfaces Incubator Group, whose purpose is to evaluate the potential for applying XML to layered models of user interfaces for applications and business processes, and to propose standardization work on markup for the concrete UI layer, declarative descriptions of event handlers, and associated task models. The architecture caters for a wide variety of delivery contexts, including mobile devices. The group has been productive, and W3C has decided to continue this work also in the next year.

Clausthal University and SAP Research have experience in presenting demonstrators for dynamic adaptive systems at exhibitions like CeBIT, the biggest IT related trade show in the world. Demonstrators created during the OPEN project could be presented at CeBIT to address not only IT experts but also to give laymen an impression of what OPEN is about and how it could enrich daily life.

3. COLLABORATION PLAN

This section is dedicated to the on-going activities of the OPEN consortium, which are related to cooperation and exchange with related projects and activities. Specific activities undertaken in the first year and a half of the project are included in an appendix together with the dissemination activities.

CNR-ISTI actively collaborates in the Service Front Ends Collaboration Working Group in FP7 discussing with the experts of the other projects belonging to this group the creation of a research agenda for this area. The project coordinator (Dr, Fabio Paternò) has attended two events for this purpose. The first one was the launch event organized by the European Commission in Brussels in March 2008, where he presented the OPEN project in the session on service front ends. Then, he attended the Collaborative Working Group on Service Front Ends workshop, which took place on June 24 2008 in Madrid, where he presented the OPEN project and participated in the initial discussion on the Service front End position paper (http://sfe.morfeo-project.org/documents/lng/es). In June 2009, Carmen Santoro (CNR-ISTI) attended another meeting of this collaboration working group.

CNR-ISTI also participates in the ServFace project, and synergies with that consortium are underway as well, for instance:

- ServFace is more focused on languages and tools for design-time
- OPEN is more focused on run-time adaptation and user interface generation

Vodafone cooperates with PERSONA (PERceptive Spaces prOmoting iNdependent Aging), which is dedicated to the quality and independence of the life of elderly people creating operational Assisted Living "Spaces". PERSONA is an integrated project funded by the European Commission within the 6th Framework Program for IST (Information Society Technologies) on Ambient Assisted Living for the Ageing Society. PERSONA, led by Vodafone Omnitel N.V. with the participation of 21 partners, intends to develop, prototype, evaluate and demonstrate Ambient Assisted Services integrated across three vital spaces where elderly people may live with the greatest possible independence and freedom: Ambient Living in the village, Ambient Living at home, Ambient Living-Neighbourhood. The organizational and topical relation between PERSONA and OPEN creates two opportunities:

- Technology developed in OPEN will be conceptually analyzed regarding its feasibility for use in the scenarios from PERSONA.
- In the other direction, results and experiences from PERSONA inform Vodafone's conceptual proposals in OPEN.

SAP Research continues to pursue synergies and collaboration with the emergency scenarios in the nationally (German) funded SoKNOS project, which is led by SAP. SoKNOS targets concepts to support public and private organizations, which cooperate in case of serious emergencies. These organizations have to plan and decide quickly, as well as safely, and have to be well-informed. The infrastructures, data and processes are distributed, which is reflected in the evolving SoKNOS

architecture. The challenges and opportunities for collaboration with OPEN are again centered on the preventive mission of SoKNOS, and the application of OPEN technology for data collection and planning in the emergency scenario. This implies that SoKNOS and OPEN together could:

- discuss ways to enhance the exchange of planning and technical data, which are relevant for emergencies – for instance geographical and simulation data
- discuss how shifts of competencies and extended roles in a planning and emergency staff can be reflected by the creation of migratory interfaces
- explore requirements and potential solutions for mobility in an emergency scenario
- compare their respective approaches to service-orientation
- use the public forum in Germany for show casing technologies from both projects

An SAP product group is currently working on an Emergency Response Consultancy Solution, and is focusing on developing solutions and guidelines to enable 3rd parties from the SAP partner ecosystem to develop consultancy solutions for emergency response, with a special focus on fire brigades. The product group is performing a fit/gap/effort and use case analysis for potential future product development.

Team members from the OPEN project are therefore cooperating with these internal product groups from public services and other research staff from the SoKNOS project. The expected contributions from the OPEN exploitable items are:

- Expertise in services enabled by application state logging, preservation and sharing/migration, i.e. informing public authorities about incidents (state sharing), or supporting the collaboration of different types of experts, i.e. in simulations that join their results on a large multi-touch display.
- Expertise on the migration of RIA (Rich Internet Application) applications developed using Microsoft Silverlight and UI components
- GIS (Geo Information System) experience, with a special focus on:
    - service integration such as traffic information & simulation services
    - state merging/joins, combining input from multiple work groups such as fire fighters, police, etc.

Arcadia Design is exploring possible cooperation with OpenInterface, a STREP project funded by the European Commission within the 6th Framework Program for IST, coordinated by Université Joseph Fourier Grenoble, where Arcadia Design is a Work Package leader. The aim of OpenInterface is to design and develop an open source platform for the rapid development of multimodal interactive systems as a central tool for an iterative user-centered design process.

As many scenarios proposed by OPEN partners require multimodal inputs, Arcadia Design foresees the use of the OpenInterface platform in the project, which is an excellent tool for choosing the appropriate multimodality to accomplish a task in a specific context.

Vice-versa, OPEN will offer context recognition and adaptation support, which could be exploited by the OpenInterface platform to improve the process of choosing the most appropriate modalities.

In addition, the OPEN project subscribed to the Future Internet manifesto launched by the European Commission. Two researchers attended the Future Internet assembly in Bled (Carmen Santoro, CNR-ISTI, and Steffen Glesser, NEC), in which a poster about the OPEN project was presented. The OPEN consortium plans to continue to contribute to this initiative. A poster was also presented at the Future Internet Symposium FIS, which took place in Vienna in September 2008.

4. EXPLOITATION PLANS

The following section is dedicated to the intentions of the consortium for the exploitation of the conceptual and technological results from OPEN. It includes a preliminary exploitation plan for each partner, which makes the business or operating models of each partner explicit and describes their opportunities to exploit OPEN results. In this way, all partners can look for synergies and opportunities that cross companies and institutes.

5. EXPLOITATION PLAN FOR CLAUSTHAL UNIVERSITY OF TECHNOLOGY

5.1. PARTNER PROFILE OF CLAUSTHAL UNIVERSITY OF TECHNOLOGY

The department of Software Systems Engineering at Clausthal University of Technology was founded in January 2007 and is headed by Professor Dr. Andreas Rausch. The research activities focus on the following topics: Software architectures for distributed systems and component technologies, model- and view-based specification and modeling techniques, development and adaptation of software systems engineering process models, and design and implementation of seamless tool support for software systems engineering techniques.

The department of Professor Dr. Andreas Rausch has extensive experience with mathematically grounded, formal theories for component-based services. These are the basis for work on the formal grounding of UML-based, graphical description techniques. These specification techniques enable a precise and complete description of the service interfaces and environment models of component services. For description we use a formally grounded component service term. This term facilitates the integration and verification of component services at the level of specification.

Within the area of component-based services, the chair of Professor Dr. Andreas Rausch has worked out a formal system model. First techniques for description and infrastructural concepts for mobile and self-integrative services have been designed based on this model. In order to evolve these approaches for reliable self-integrative services, the chair of Professor Dr. Andreas Rausch has concentrated its activities on systems in the context of Ambient Intelligence.

The chair of Professor Dr. Andreas Rausch has been a member of the research focus area AmI at the University of Kaiserslautern. Furthermore, he has been leading the middleware subproject of the BelAmI project (Bilateral German-Hungarian Collaboration Project on Ambient Intelligent Systems). The chair of Professor Dr. Andreas Rausch has realized a framework for the development of dynamic-integrative software systems. A prototype demonstrator based on CORBA has been elaborated, which is capable of dynamic integration of components at runtime [AKK+06]. This demonstrator has been used within the Belami project for the dynamic integration of 20 components within the assisted living demonstrator and can be extended with a runtime verification mechanism needed in this project.

In addition to devices with high computing power, small sensor nodes have also been dynamically integrated into a system using the developed infrastructure [KNW06]. Moreover, the department has extensive experience in designing open, distributed software architectures, which were designed and used in research as well as in industry.

In order to prove the sustainability of those concepts, the department has developed several platforms and tools. It also has extensive experience in the design and prototypical implementation of execution environments and tool support.

5.2. CORE COMPETENCES OF CLAUSTHAL UNIVERSITY OF TECHNOLOGY

5.2.1. FLEXIBLE SOFTWARE ARCHITECTURES

The members of the department headed by Prof. Dr. Andreas Rausch develop architectures and middleware solutions for distributed systems. At runtime these systems are able to automatically adapt their internal structure and behavior to the constantly changing environment. Concomitant maintenance of correctness and reliability are of special interest in the adaptation process.

5.2.2. SYSTEMATIC MODELING

Large systems and system landscapes place special requirements on modeling. Highly abstract models are necessary in the early development phases. Distributed and parallel modeling is also necessary. The main research goal of Systematic Modeling is to support the modeling of such systems with the aid of approaches and tools that function across the phases and integrate them.

5.2.3. ADAPTABLE PROCESS MODEL FOR ENGINEERING SOFTWARE SYSTEMS

Every software-systems engineering project is different, although the same or similar activities are executed. Process models standardize and exemplify software development processes, but are cumbersome to introduce and realize in a company. In these research projects of CIU a basis for adapting process models easily and without high costs for a company is developed.

5.3. EXPLOITATION STRATEGY OF CLAUSTHAL UNIVERSITY OF TECHNOLOGY

5.3.1. STUDENT WORK

Advanced project – Realization of State Persistence during the Migration of OSGi bundles

In the prototypes for OPEN the service platform OSGi is used for the realization of the application logic. OSGi applications are composed of bundles. At the migration of the application logic these bundles are stopped. The code is transferred to the target platform and the bundles are started there again, after the behavior of the bundles is adapted to the execution environment. The migration and the adaptation are already implemented in a prototype. But currently it is not possible to extract the state of the bundles before the migration and to restore it at the target platform. In this advanced project the prototype is extended by the following functionality: Before the migration the state of the concerned OSGi bundle is extracted, and is restored after the migration. This allows the user a smooth resumption of the application usage.

Diploma thesis - Context-based Wiring of Components in Dynamic-Adaptive Systems

Dynamic adaptive applications usually consist of several components, which are dynamically linked at runtime based on context information (e.g. location and time of execution). If the

context information changes these links may have to be changed or adapted. For this reason a component specifies, among other things, which components it can cooperate with, and which component is the best for any given environment, that is, set of context information. The goal of this work is the creation of a conceptual model to describe this dependence. Additionally this model should be implemented and integrated in the middleware DAiSI. An application example should illustrate the functionality.

5.3.2. DISSERTATION

"Template-based Concept for the Realization of Mobile Adaptive Applications"

The goal of this thesis is to develop a concept which enables the easy development of mobile adaptive applications which are able to adapt their behavior during runtime based on context information. The concept will enable the developer to specify this adaptation behavior in a declarative way.

This is relevant to OPEN because we are dealing with applications which migrate from one device to another and which therefore have to be adapted to the target device. As developers of such adaptive applications should not deal too much with technical details of how to realize adaptability, but on implementing the application functionality itself, the thesis aims at providing a solution for that.

5.3.3. UNIVERSITY LECTURES

Informatics days at the Clausthal University of Technology

In June 2010 the informatics days at the Clausthal University of Technology takes place. On this day the informatics institute of Clausthal presents itself. By lectures and demonstrations the current research results the Clausthal University of Technology gives an insight into the running projects and the current work.

5.3.4. TRADE SHOW PRESENTATION AT CEBIT

The “Centrum für Büroautomation, Informationstechnologie und Telekommunikation” (CeBit) is the biggest trade show for information technology worldwide. Since 1986 CeBit has taken place every spring. At CeBit the Clausthal University of Technology presented several research results in the past years. For instance we presented a prototype for a rescue assistance system during disaster operations at the CeBit 2009. The next CeBit takes place from the 2.-6. March 2010. At this, the CIU intends to present the actual research results including the results of OPEN:

- Pacman prototype using the ALR to reconfigure the game logic depends on context information during runtime.
- Prototype for twittering, which is planned in cooperation with NEC. It will use the ALR to reconfigure the presentation logic.

6. EXPLOITATION PLAN FOR AALBORG UNIVERSITY

6.1. PARTNER PROFILE OF AAU

Aalborg University (AAU) was inaugurated in 1974 and is thus a young and modern university which, over the years, has grown to become a large, well-established research and teaching institution in Denmark offering quite a range of educational programmes and research in the fields of Humanities, Social Sciences, Engineering, Science and Medicine Research. Aalborg University has since its start used the teaching methodology of Problem Based Learning (PBL [Rhem98]), which means students are given a larger problem they work on during a semester along with the courses. For the engineering field such could typically be a problem coming from the industry or from European projects as OPEN, hereby stimulating the collaboration between the university and industry.

Aalborg University encompasses three faculties covering the three research and educational areas, under which all research and educational activities take place. Each faculty is organized into a number of departments, centers and schools, which work with specific scientific areas within the faculty's main areas.

The group involved in OPEN is the Network and Security group (NetSec) belonging to Electronic Systems under the Faculty of Engineering, Science and Medicine Research.

6.2. CORE COMPETENCES OF AAU

The Network and Security group focuses on multidisciplinary areas of wired and wireless networking (IP Networks, Mesh Network, wireless sensor networks, RFID, etc.). Some of our research encompasses network architectures, network planning, security, privacy and trust, mobility, resource and context management/discovery & quality of service, multi channel MAC protocols, end-to-end dependability & resilience, IP-based multimedia subsystems (IMS), enhanced methodology of analysis, analytic models & simulation techniques, traffic and queuing Models. For the OPEN project, AAU brings in expertise on the area of…

- System architecture design and analysis of distributed, networking systems with focus on
    - Mobility support
    - Context management
    - Trigger management
- Implementation experience for demonstration support
- Modeling for performance evaluation and optimization study for research activities on the above topics

6.3. EXPLOITATION STRATEGY OF AAU

The technology being developed will be used for several purposes at Aalborg. For the Context Management Framework (CMF), developed jointly with NEC, the following are considered

- As an enabler for researching and developing new context aware components, e.g. via Problem Based Learning projects for which students may use the CMF, [D3.1], as a basis to develop complex, context aware applications
- Continuous use of framework in subsequent research projects

More generically, the AAU focus will be on the publication of papers, journals and presentations at relevant forums and conferences.

- Use of concepts and the developed test bed to perform research which will be disseminated through conference papers and/or journal papers, and participation at conferences world wide as well as by presentations at various relevant forums. In particular the feedback from the test bed applications is of key value for producing highly relevant research contributions. Examples of topics of AAU interests are
    - Analytic models of context information providing information of the reliability of remotely accessed dynamic information, leading to additional meta information about the accessed context information.
    - The link between reliability metrics of dynamic context information and the used context model, which may lead to additional useful parameters describing context information.
    - Study on migration trigger reliability and how the use of dynamic, remote accessed and imperfect information affects the reliability of automatic triggered service migration.
    - Online network performance measurements and estimation in relation to the migration process.

      Some potential candidates for dissemination forums are
    - IEEE International Symposium on Personal, Indoor and Mobile Radio Communications, September 2010
    - IEEE GLOBAL COMMUNICATIONS CONFERENCE, December 2010
    - International Workshop on Middleware for Pervasive Mobile and Embedded Computing, Nov. 2009
- Basis for teaching and courses;
    - Context management courses on the gathering and distribution of dynamic context information in networks
    - Mobility support at the application level
- Ph.D. Thesis work: the part of the work AAU is responsible for on Trigger Management and mobility support will be part of a Ph.D. thesis work, hence will lead to substantial contributions to this research area.

AAU has furthermore developed a wireless network emulator, initially in the project HIDENETS, and extended in OPEN, which will be used later in the project for performance evaluation purposes of the support platform. The plan for this emulator is as follows

- Providing the wireless network emulator as open source code project at e.g. sourceforge.net.
- Further use it in other projects

7. EXPLOITATION PLAN FOR ISTI-CNR

7.1. PARTNER PROFILE OF ISTI-CNR

CNR-ISTI (www.isti.cnr.it) is a public research Institute of the Italian National Research Council. The main research area of ISTI-CNR is computer science. In this area, ISTI-CNR aims at increasing knowledge, developing and testing new ideas and widening the application fields. The Institute is structured into a number of laboratories, ranging from networking, visual and high performance computing, to software science and technologies, and knowledge science and technologies.

7.2. CORE COMPETENCES OF ISTI-CNR

The laboratory involved in this project is the laboratory on Human Interfaces in Information Systems. The main goal of this laboratory is to investigate new solutions in basic and applied research in the field of human-computer interaction, user interface software, and interactive information systems. The main aim is to carry out research in methods and tools to support user interface designers and system developers to obtain usable systems that can be accessed from different contexts of use. This activity has mainly been carried out under the aegis of national programmes, international programmes and research contracts.

For more information about the HIIS Laboratory see http://giove.isti.cnr.it/

7.3. EXPLOITATION STRATEGY OF ISTI-CNR

CNR-ISTI is a public research Institute, also actively involved in technology transfer to the industry and the society. The results of the OPEN project will be a set of methods, associated tools and prototypes obtained by the application of them in the area of migratory user interfaces.

The principle routes through which CNR-ISTI will transfer to the industrial and scientific communities are:

- Research. The results of the project will be documented and published within the general scientific community, both through conference and journal papers.
- Training. In order to ensure that the results of the project will be communicated to a wide community, various initiatives will be organized. To this end, we participate to seminars and workshops about related topics. Wider industrial groups will be reached through seminars presented to other organizations with which we are in contact, and to groups of industrial users. We give tutorials presenting the project results as well as discuss them in university courses.
- Design Process Improvement. One important result of OPEN will be a service platform for supporting dynamic multi-device applications. By developing the techniques in conjunction with industrial partners we aim to ease the path for integrating research results into the design process employed by the current industrial practice.

- Results of the Application of Concepts Developed. Work on the case studies, involving collaboration between researchers and members of the industrial and research organizations taking part in the consortium will be ongoing over the life of the project. One result of the application of the methods developed will be prototypes that will be validated against user requirements. These prototypes will show designers and developers how the new methods and technology can improve their work. They will also show that the new methods and technology address the needs of many applications in Europe.

- Industrially engineered products. We will also investigate how to obtain engineering products from the methods, tools and prototypes developed in the project, which can be exploited by the project partners or through specific spin-off companies to which CNR-ISTI can participate. By *engineered products* we mean applications which can be immediately used in real context.

In particular, in terms of conferences and publications ISTI-CNR has attended the End User Development conference in Siegen (Germany) and plans to attend Mobile HCI in September 2009 in Bonn (Germany) and the 3rd European Conference on Ambient Intelligence in Salzburg (Austria) in November. A paper has been accepted for the Computer Journal and another one has been submitted to the ACM Transactions on Computer-Human Interaction journal.

In terms of lectures and tutorials, Fabio Paternò regularly teaches a course on user interface design at the University of Pisa and has given tutorials and seminars in various universities and centers in Europe on multi-device user interfaces teaching concepts that are under investigations and further refinement in the OPEN project.

ISTI-CNR is also a member of the ServFace Project (*www.**servface.eu***), in which MARIA XML, a new language for describing user interfaces for multidevice applications, including those exploiting compositions of Web Services, are considered. ISTI-CNR plans to use the results gained by using MARIA XML in migratory interactive applications, as a way to experiment with the type of support that such a language offers for migration in various contexts of use, and also to provide feedback to the ServFace project based on the experience of the MARIA use in OPEN. This will be useful for improving the language itself.

Within the OPEN project, ISTI-CNR is following possible standardization activities carried out based on the results of the project. In this regard, interesting groups are: the W3C Model-based User Interfaces Incubator Group and the Ubiquitous Web Applications W3C Working Group. In particular, ISTI-CNR is actively contributing in the W3C Model-based group.

ISTI-CNR has also actively participated in the Services Front End (SFE) Collaboration Working Group in FP7, presenting the OPEN project and discussing with other projects issues and solutions in design and development of context-dependent interactive applications. The Service Front End Collaboration Working Group aims to provide a playground for collaboration between projects in this field, addressing evolution of existing front-end web technologies and the standardization of results. As a first result of collaboration, the Service Front End (SFE) Open Alliance (http://sfe.morfeo-project.org) was launched. The SFE Open Alliance is targeted to materialize open reference architecture for the front-end part of the future Internet of Services.

ISTI-CNR has also participated in the discussion regarding the Future Internet, in particular in the discussion on what are the research challenges associated with the Future Internet Functionalities.

7.4. IDENTIFICATION OF OPPORTUNITIES

Within the OPEN Project, ISTI-CNR aims to exploit its expertise in the field of multi-device user interfaces.

7.4.1. OPPORTUNITY 1: SOLUTIONS FOR MIGRATORY WEB APPLICATIONS

In this project ISTI-CNR is developing a method and a corresponding prototype to support migratory Web applications. The solution exploits XML-based languages for logical user interface descriptions and is able:

- to reverse engineer existing Web pages in order to create the corresponding logical description;
- to adapt the logical description to the target device;
- to preserve the state of the interactive application across various devices;
- to dynamically generate the implementation for a target device.

The overall solution or each component part can provide interesting opportunities for exploitation. In particular, the solution for migratory user interfaces can be useful in emerging multi-device environments, where people want to continue their activities across various interaction devices. Indeed, nowadays users are surrounded by environments characterized by an abundance of devices and appliances that they use for carrying out their everyday activities. In order to improve user experience, the surrounding environments should be intelligent enough to allow users to freely move around, and to be able to perform their tasks in a continuous manner, without forcing them to start their interactive session from scratch at each device change. This would be appreciated in various intelligent environments that characterize our daily life, such as home, offices, and museums. For example, a home server that supports access to various domestic appliances can be extended with our software so that users can access them through various interactive devices with the possibility to migrate the user interface while freely moving.

Thus, we plan to investigate how to make commercially exploitable our results in the project. We foresee two possible solutions:

- Creation of a spin-off, whose market would be the installation of our migration platform for clients, which can be either software companies or user organizations. The spin-off could also make open source the software developed in order to stimulate interest and work in the tailoring of the software to specific environments;
- Definition of commercial agreements with software companies, which buy our software and then adapt it to their specific use and commercialization.

8. EXPLOITATION PLAN FOR ARCADIA DESIGN

8.1. PARTNER PROFILE OF ARCADIA DESIGN

Arcadia Design (Arcadia for short, project beneficiary short name: AD), a SME based in Cagliari (Italy), was founded in 2001. Company's mission is to research, develop and utilise technological innovations in software applications and in particular user experience and new generation 3D multimedia contents, especially for mobile phones. Activity spans two main areas: digital entertainment and advanced software applications, with full-cycle management from concept to design to ready-to-use solutions.

For more information: http://www.arcadiadesign.it/

8.2. BUSINESS MODEL

Arcadia Design's core business is the design and the development of customized solutions for customers: games (including multiplayer mobile games), multimedia solutions, integrated hardware & software development.

The typical path starts from customer needs and ends with the final software or solution deployed.

Results obtained from the gaming action line are fundamental to drive further design and development efforts: in particular, they allow for reusing, after adaptation, software elements already developed in projects, such elements include:

- Network management system
- Server architecture components
- Multiplayer architecture
- Framework for 3D engine on mobile phones

Arcadia recognizes the benefit of reusing outcomes coming from projects run at different levels (European and local) and builds on experience gained with research projects, such as the FP6 research projects OLGA and OpenInterface.

During OLGA (OnLineGames) project a great deal of expertise with multiplayer mobile games was acquired. Such know-how, and similar expertise accumulated through the years in several technologically challenging contexts, allows for a faster development lead time, for a better adherence to customers' specifications (going beyond customer's expectations in order to reach customer satisfaction to the highest extent) and for setting up internal procedures for risk anticipation and mitigation as far as the design, development, deployment and maintenance activities are concerned.

The OpenInterface project brought to Arcadia deep knowledge about novel interaction modalities and multimodal interactive systems applied to games, both on PC and mobile phones. Moreover, the user centred design approach followed in the project has been applied in the development process of some Arcadia products, starting from conceptual design to the evaluation of intermediate and final releases.

8.3. EXPLOITATION STRATEGY

Arcadia Design is focusing its exploitation efforts to bring all innovative technologies beneficial for the company's mission to a usable level in the projects currently in progress and in the forecasted domains of interest for new projects. The awareness of being a SME shapes the modalities of exploitation of research & development by putting a high focus on short- and medium-term perspectives: at the same time a long term strategy is pursued as well, and partnerships with primary organizations (other SMEs, large enterprises, academic research centers, and institutions) are evaluated and set up whenever a suitable context shows up.

Arcadia has been optimizing its internal decisional and operational procedures through the years with an extended involvement (according to the various levels of accountability and responsibility) of all the internal resources in order to enhance the company's human and technological capital.

Among other benefits, this approach has led to a significant reduction in the transfer time of specific know-how within its technical staff and in shortening the introduction cycle of new products and solutions in the marketplace.

Once a technology has been studied during a research project and further to a successful review, the technology gets immediately transferred on a demonstrative project that can show the opportunities for the envisaged technology and create a "showroom" for the technology itself. As a result of OPEN, showcases to demonstrate the migration, total or partial, of user interfaces are planned. These showcases would also exhibit adaptation of the user interface to the target device format and capabilities.

The technological issues and architectures that have been addressed under the OPEN umbrella (especially the migration of user interfaces or parts of user interfaces between different devices and their adaptation to the format and capabilities of the target devices) show a good fit of Arcadia's general strategy with the specific exploitation opportunities provided by OPEN. The particular technologies that Arcadia has been studying and developing will contribute to Arcadia plans to increase the offer to prospects and customers, especially towards innovative 3D web-based solutions and towards devices interacting in new scenarios.

8.4. IDENTIFICATION OF BUSINESS / TRANSFER OPPORTUNITIES

Three main areas have been identified by Arcadia Design for its exploitation efforts:

- **Games & Technologies –** an area that corresponds to the main sector where Arcadia has received broad market recognition for its technical excellence, from 3D Worlds to Mobile Multiplayer Games to Novel Experience interactions

- **eMobility –** an area where Arcadia has been able to intercept emerging trends since their first appearance with a full recognition of the mandatory necessity to keep updated and aligned with evolving standards and increased demand for security (e.g. Mobile Banking applications)

- **Pilot Projects –** Pilot projects are systematically used by Arcadia to bring technology from a research project to business scouting opportunities for value creation. In general, new approaches for proposing services, optimizing user interfaces and ergonomy, reaching broader audiences and enlarging customer bases are taken into account. Specifically, by considering the OPEN outcomes, Arcadia has been investigating pilot projects that use the technologies developed under the frame of the OPEN project to target the eMobility area and the 3D area in web browsers.

Arcadia's strategy in the identification of the business opportunities of the considered technologies relies on a careful analysis of the experience previously obtained in projects aimed at faster innovation, specifically in the European research programmes.

Once the envisaged technology is considered suitable for product transfer or project transfer, then the technology enters a standardization step to harmonize it with the company's internal development system and technical information flow. Further to this standardization step, the technology becomes usable in one or more projects and feedback on its usage, and a full description of possible problems encountered and solutions for overcoming them, is provided.

The most outstanding part of what Arcadia aims to introduce in its products based on the technology developed in the OPEN project, resides in the use of the web browser plug-in developed for the Social Game and in all the technologies that stand on the server side of the system.

The browser 3D plug-in is the part of the social game that draws 3D content in real time in a web browser pane: this is an important technology with concrete returns expected in the short-term and suitable to provide Arcadia with a better position in the market.

The 3D browser plug-in is tightly related to its counterpart, i.e. the server side that feeds the browser with all the data and information necessary in order to display a 3D scene. The server manages both graphic data and the state of the 3d graphic object in each moment: this occurs in real time by using techniques like physical simulation and multiuser management to achieve this challenging result.

Also important to insert in Arcadia's future multiplatform products is the migration and adaptation of interfaces, the switch from one device to another, and the transfer of user interfaces, e.g. from a PC to a mobile phone.

Arcadia is currently investigating specific commercial opportunities deriving from the main outcomes of OPEN with key customers in the two main areas identified above, i.e. Games & Technologies and eMobility. A first step has been a domain redefinition grounded on two fundamental factors found out in the OPEN project: new concepts of usability applied to migration (device adaptation, continuity and increased service reliability, including security aspects) and the combination of 3D web browser plug-ins with novel paradigms of interaction with large screens capable of device sharing among multiple users.

For the infotainment industry the last factor ranks first in a list of possible usages with high forecasted impact. A more structured approach to the infotainment industry, a broader coverage of contexts commonly experienced in ambient assisted living (AAL) environments (with highly-rated business opportunities in the well-being & inclusion applications, e.g. for homecare and elder people assistance) and an increased confidence with device discovery techniques and trigger management aspects are considered by Arcadia as building blocks for a renewed commercial strategy.

This strategy is suitable to bring valuable results (financial ones and results in terms of raising the company's technological reputation in market domains not yet addressed as of today) in a medium-term window with expected faster return rates for some segments or sub-segments (Business Games, Educational 3D integrated support platforms, user-centric touristic systems with extended access from PC to PDAs and smart phones) where the adoption of OPEN outcomes appears more straightforward.

9. EXPLOITATION PLAN FOR NEC

9.1. PARTNER PROFILE OF NEC

NEC Corporation is one of the world's leading providers of Internet, broadband network and enterprise business solutions dedicated to meeting the specialized needs of its diverse and global base of customers. NEC delivers tailored solutions in the key fields of computer, networking and electronic devices, by integrating its technical strengths in IT and networks, and by providing advanced semiconductor solutions through NEC Electronics Corporation. Empowered by innovation, its solutions, products and services are backed by the leadership and expertise of one of the most successful global companies, conducting business for more than 100 years.

NLE-IT, the IT Research Division of the NEC Laboratories Europe was NEC's first European research laboratory and was established in Sankt Augustin, Germany in 1994 as the C&C Research Laboratories, NEC Europe (CCRLE).

NEC Europe Ltd. also established NLE-NW, the Network Research Division of the NEC Laboratories Europe in Heidelberg, Germany in 1997 as a successor of NEC's C&C Research Laboratory in Berlin. It was NEC's second research facility in Europe. Here research and development functions are integrated into the same organization in order to shorten the time to market of cutting-edge network technologies.

9.2. CORE COMPETENCES OF NEC

The initial target of NLE-IT was collaborative research in the field of high-performance computing (HPC). As high-performance computers have for the last 15 to 20 years been parallel systems, NLE-IT has a wealth of experience in programming parallel computers and has devised, developed and maintained tools for simplifying the laborious work of programming these systems. Today, parallel computing is ubiquitous. Embedded systems and personal computers are equipped with multi-core processors and huge grids of servers combined with software for virtualization and applications offer customers access to nearly unlimited computing power - Cloud or Grid Computing.

Thus, the research area of NLE-IT now covers tools and middleware for parallel and distributed computing on parallel machines ranging from embedded to HPC systems - and software platforms for Service Oriented Architectures such as distributed IT services for cross-enterprise collaboration.

NLE-NW focuses on software-oriented research and development for the next generation Internet. New communication architectures and protocols supporting multimedia and mobility over the Internet, together with intelligent Internet services, constitute the core of the work. A market research team continuously analyses market trends and market requirements to ensure that R&D activities address actual market needs. The laboratories put special emphasis on solutions meeting the needs of NEC's European customers.

Integration of services into business and private life requires a level of flexibility that exceeds by far yesterday's service capabilities. Today we do not think in terms of individual services, but rather about how to combine multiple services easily, how to customize them quickly, and which basic service components will make future services more useful and more convenient. Services of the future should adapt to the user and contribute to his or her own content, offer personalization, adapt to context, and be available whenever and wherever they are needed.

9.3. EXPLOITATION STRATEGY OF NEC

The general target of the NEC Laboratories Europe's with its divisions NLE-IT and NLE-NW is the provision of technologies and proof of concept demonstrations in support of NEC business units which will develop new products in line with their market presence or aligned with new market development. The European research labs support global sales activities with a focus on the European divisions, by pushing research and development to the local NEC branches. Also, research results are being presented at international fairs when the opportunity arises. E.g., NLE-IT has presented latest SW-developments for Multicore systems at the iExpo 2008 to an international audience. The iExpo introduces cutting-edge IT & Network solutions that support customer innovation and the latest technologies that serve as the backbone of these solutions.

NEC Europe has taken measures to accelerate technology developments towards IT and Network integration and at the same time to increase the efficiency of its R&D activities in Europe in view of the severe economic climate. The IT Research Division of NEC Laboratories Europe will be closed at the end of 2009, with the intention that a part of the research activities aligned with the accelerated IT-NW integration target will be moved to NEC Laboratories Europe, Heidelberg. The Multicore related functions developed by NLE-IT within the scope of OPEN will be taken up by NLE-NW and integrated into the migration context thus providing an example for successful IT-NW integration.

With an integrated approach to research, standardization, and development NLE-NW ensures a continuous stream of new product ideas. The Division considers early standardization as being key for market success and encourages staff with excellent technical skills and a good understanding of emerging technologies and market trends to contribute to standardization bodies. In this way, the NLE-NW receives valuable feedback on its own ideas and technologies, before they are transferred into products, and helps building solutions aligned with the latest advances. By conducting market research in Europe and by supporting technical marketing of NEC projects, the Network Research Division acquires deeper understanding of customer needs and can focus activities accordingly.

9.4. IDENTIFICATION OF OPPORTUNITIES

9.4.1. OPPORTUNITY 1: DIGITAL SIGNAGE MARKET

Digital Signage refers to the trend whereby paper signs are replaced with electronic displays. The electronic implementation of signage allows for altering the content depending on different

quantities such as the time of day or the weather. Also the current situation and context of the observer can be taken into account. Digital signage is therefore far more flexible and economical.

While the industry is progressing quickly with regard to the required technologies, content still remains fairly static. We believe that, by introducing content management and context technologies, we can further increase the range of applications that such devices can be applied to.

In this area, application migration represents a great step forward, in that everyday users might use public displays to perform some of the work they were otherwise doing on their mobile devices and portable computers.

Context technologies can further enhance migration by providing appropriate privacy mechanisms, interaction models, and advanced triggers.

NEED FOR SYNERGIES OR COLLABORATION WITH CONSORTIUM MEMBERS:

NEC is working together with all the OPEN partners to realize the project objectives, and is open to future collaborations to further develop these technologies.

NEED FOR SYNERGIES OR COLLABORATION WITH OTHER PARTIES (OUT OF THE CONSORTIUM):

No external synergies or collaborations have been identified at the moment.

OPEN SOURCING POSSIBILITY

NEC will consider Open Sourcing possibilities on a case by case basis, and remains open to the possibility.

DETAILS OF ANY RELATED IPR

Where applicable, patents will be applied for. No patents have been filed at the moment.

9.4.2. OPPORTUNITY 2: MULTICORE TECHNOLOGIES

Improving the performance of CPUs of embedded systems, personal computers, and servers by increasing clock frequency has become difficult due to physical reasons. So nowadays, instead of increasing clock frequency manufactures equip their CPUs with several computing cores in order to gain more performance. However, such systems are more difficult to program as the application has to be split up in several tasks which can be computed independently on the different cores and then these tasks have to be scheduled to the different cores so that workload is distributed evenly. In order to simplify the problem of even task scheduling, NEC has developed the Task Programming Interface "TPI". (TPI is NEC *background in the sense of the Consortium Agreement and Grant Agreement Annex*.) TPI was designed specifically for mobile and embedded

systems, in particular for multiple concurrent applications requiring continuous execution irrespective of system load.

In the future, Multicore systems will continue to prevail. In order to further simplify the usage of Multicore processors NEC considers a high-level API of TPI to be helpful. Such an interface is to provide sophisticated functions for a dedicated scenario which make the exploitation of parallelism transparent to the application programmer.

Of course, Multicore architectures will also be present in migration scenarios and NEC considers it to be important to ensure that an application while migrating from one device to another optimally exploits the different number of cores available on the different devices.

Within the context of OPEN NEC has developed the Native Multicore GUI Library “Namuco" which builds on TPI and supports the application programmer while developing graphical user interfaces. In order to improve the performance of computationally intensive GUI effects, Namuco exploits Multicore capabilities if provided by the device to which the application is currently migrated. NEC has equipped Namuco with a Java-Interface in order to simplify applicability.

The exploitation of Namuco will be threefold:

1) Namuco will provide important insight into the applicability of TPI in the scope of a complex application scenario. This insight is helpful for further developments of TPI.

2) Namuco will help to gain experience concerning the applicability and usefulness of a high-level API of TPI in general.

3) If Namuco proves to be helpful and mature enough it may trigger technology take-up by NEC's business units. A higher-level interface like Namuco could then be provided with a TPI product, either as a part of the product or as an open source supplemental package.

NEED FOR SYNERGIES OR COLLABORATION WITH CONSORTIUM MEMBERS:

NEC has provided Namuco with a Java interface in order to simplify usage. NEC encourages partners to use this library and is eager to get feedback on Namuco and its underlying multi-core middleware TPI.

NEED FOR SYNERGIES OR COLLABORATION WITH OTHER PARTIES (OUT OF THE CONSORTIUM):

No external synergies or collaborations have been identified at the moment.

OPEN SOURCING POSSIBILITY

NEC considers making Namuco Open Source. Precondition for this is the positive feedback of partners concerning the usability of Namuco.

DETAILS OF ANY RELATED IPR

Where applicable, patents will be applied for. No patents have been filed at the moment.

10. EXPLOITATION PLAN FOR SAP AG

10.1. PARTNER PROFILE OF SAP

SAP, which was founded in 1972, is today the world's leading provider of business software, offering applications and services that enable companies of all sizes across more than 25 industries to become best-run businesses.

SAP has more than 82,000 customers (including customers from the acquisition of Business Objects) in over 120 countries, and employs around 50,000 people at sales and development locations in Europe, the Middle East and Africa (EMEA), the Americas, and the Asia-Pacific regions. It is headquartered in Walldorf, Germany.

For more Information about SAP AG and its products and services see www.sap.com.

10.2. BUSINESS MODEL OF SAP

SAP's core business is granting licenses to use SAP business software solutions. The product portfolio comprises the SAP Net Weaver platform and software applications, including:

- mySAP Business Suite solutions, which help enterprises improve business operations ranging from supplier relationships to production to warehouse management, sales, and administrative functions, through to customer relationships
- Prepackaged mySAP All-in-One and SAP Business One solutions for small and midsize enterprises (SMEs)

Specific solutions for more than 25 industries in the discrete manufacturing, financial services, consumer, public service, process industry, and service sectors

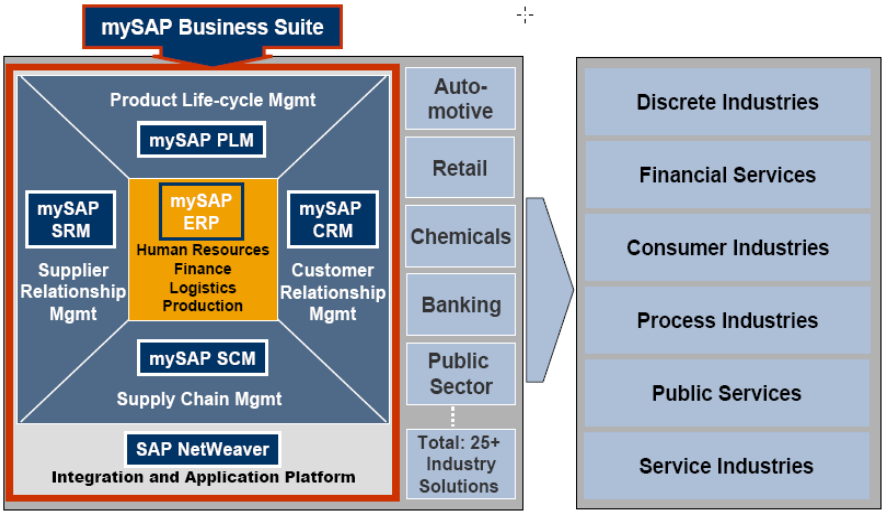

Figure 2 SAP's Enterprise Application Software

SAP also sells maintenance, consulting, and training services associated with its software products. The Company both develops and markets products in close cooperation with business partners. Figure 2 represents SAP's business model with regard to its major revenue streams "sales", "implementation", "maintenance" and "training" in combination with the respective revenues in 2005.

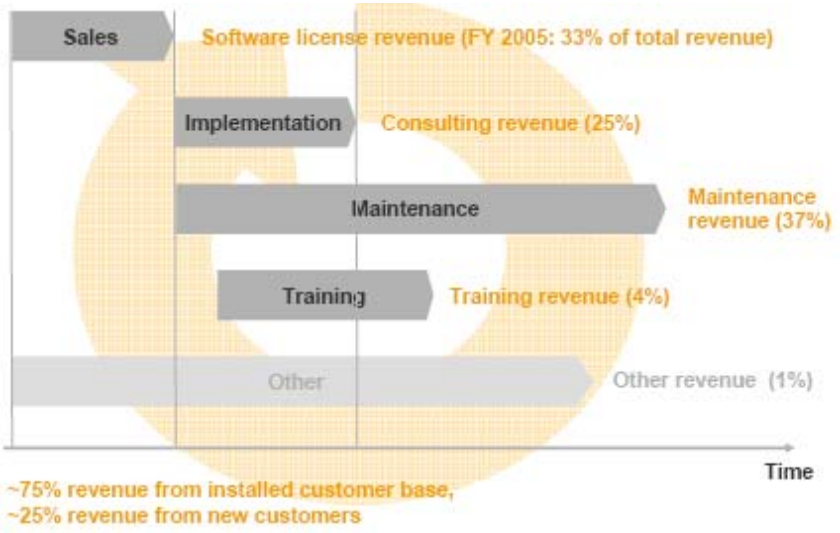

Figure 3: SAP's business model

Software revenue growth is the key revenue growth driver because it tends to stimulate other revenue for the company. The chief source of software revenue is fees customers pay for software licenses. Generally, customers that buy software licenses also enter into maintenance contracts covering support services, regular software maintenance, and software updates and enhancements. These maintenance contracts generate recurring maintenance revenue after the software sale. Software revenue and maintenance revenue together are categorized as product revenue. Software revenue also stimulates service revenue from consulting and training sales.

10.3. EXPLOITATION STRATEGY OF SAP

10.3.1. THE SAP RESEARCH APPROACH

In SAP Research Europe, most projects follow an integrated, long-term plan and are often executed jointly with groups of external partners, and frequently co-funded by external funding bodies such as the European Commission.

SAP Research constantly reviews projects and innovative ideas, looking for what works, what is relevant, and what should be discarded. This screening process takes the pulse of technological change and influences its direction. The Group's activities operate according to different timescales. By differentiating between applied research portfolios of three years or less and experimental research portfolios of seven years or less, SAP Research is able to address technological trends of various durations. Some projects are also extremely short-term, lasting only up to one year. These are mostly internal transfer projects within SAP to transfer research results into products. (This research process is shown in Figure 4)

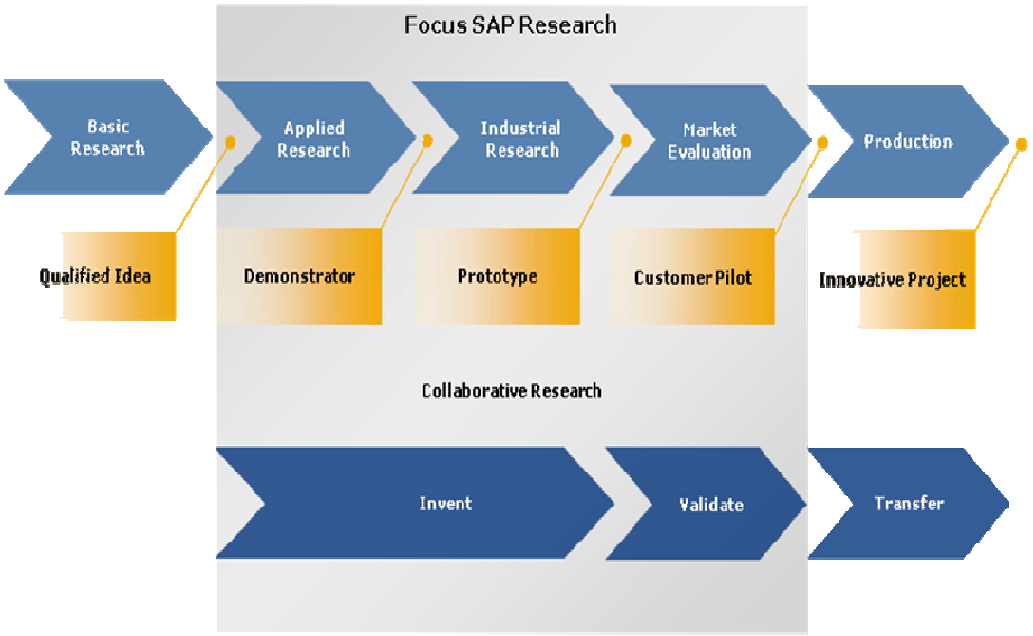

Figure 4: The SAP Research Process - from Idea to Innovative Product

In order to effectively make use of the research results from the OPEN project at SAP, an integrated approach will be applied, combining experience and expertise from the development department, marketing specialists, and the involvement of SAP customers as appropriate.

10.3.2. THE SAP EXPLOITATION STRATEGY

Within OPEN, SAP Research is focusing its research efforts on gaining experience and knowledge about how the combination of context information and user interface migration can be utilized to enable more intuitive and effective user interaction in daily work environments. An initial application area under investigation is better support for collaborative response planning in emergency situations like flooding.

SAP Research is directing its OPEN exploitation efforts towards the transfer of knowledge into SAP's Product Technology Units (PTU) and industry Business Units (IBU).

SAP Research has a proven history of successfully transferring the results of research projects from different areas into the relevant business units, and, as a matter of fact, this it is one of the major goals of SAP Research. However, the process of adopting knowledge and results developed in, or inspired by, OPEN and the process of integrating them into new or established products largely depends on the business unit.

In addition to industrial exploitation the SAP Research team engages in scientific exploitation by publishing papers, contributing to journals/magazines or attending conferences and developing profiles and standards.

10.3.3. SAP VALUE CREATION

The applied research process of SAP Research is a lively process featuring a wide variety of interactions between the various research phases, the overall SAP development processes, and the necessary feedback loops within the product groups. The main focus is on new technological concepts and their potential integration into the SAP software environment.

Activities to leverage results of collaborative research projects have multiple potential targets:

- Product Groups are responsible for the further development of the SAP portfolio. Working with SAP Product Groups gives SAP Research the opportunity to influence the next generation of products using project results.
- Technically-oriented Customers and Developers are interested in new developments that they can use to improve their current situation. To address technically-oriented customers and developers SAP has created the SAP Developer Network (SDN – http://www.sdn.com). A large variety of resources for this target group is available on SDN free of charge, ranging from blogs discussing new technologies to tools that can be downloaded and used. SDN has more than 1.3 million members in over 200 countries.
- The general public is interested in learning about new developments that could become relevant for industry in the future.

To address the different stakeholders for exploitation SAP Research is using different exploitation mechanisms. Table 1 summarizes the way SAP Research addresses the different targets for OPEN results.

Partner SAP	Exploitation Mechanism	Exploitation Target
	Transfer activities	Product Groups (Public Security Industry Solutions and Performance Optimization Application-Shared Business Components)
	SAP Developer Network (SDN)	Customers, Developers
	Publication, Outreach	Customers, Product Groups, Public

Table 4: Exploitation Targets and Mechanisms

10.3.4. THE SAP RESEARCH VALUE CHAIN

The value chain for SAP Research is based on the different exploitation mechanisms as identified in the previous section. Of these, transfers are the most critical, since an important success criterion is the transfer of knowledge and results from research projects into product development at SAP. Product development ranges from technical infrastructure to application infrastructure to industry solutions and business consulting services.

Successful transfers to SAP product development leads to new or improved products which will be available to SAP customers. Transfers are carried out jointly with SAP product development groups by a team consisting of members from both teams. The number and size of these transfer activities is one of the important performance indicators for SAP Research.

Furthermore, knowledge and expertise build up in collaborative research projects like OPEN is made available to other research projects. This can be achieved by making individual research results available to other projects to leverage and built upon. Additionally, project team members will transition to new research projects leveraging their expertise for new research questions.

10.4. IDENTIFICATION OF BUSINESS / TRANSFER OPPORTUNITIES

Within OPEN SAP is concentrating on a scenario about collaborative emergency response planning. This is a scenario of relevance to SAP's Public Security Solution in the area of operations support.

While SAP has been active in the public sector for many years, its solution for public security is more recent and is currently being extended into areas like operations support. **Figure 5** gives an overview of how operations support fits into the value chain of SAP's solution for Public Security, extending across the entire chain from assessment to rebuilding.

Results from OPEN have the potential to improve operations support by combining context information with user-interface migration to facilitate collaborative emergency-response planning.

In order to determine the economic usefulness of OPEN, SAP Research is directing its OPEN exploitation efforts into validating and transferring the acquired knowledge into the Public Sector/Public Security Industry Business Unit (IBU).To exploit this potential SAP Research is focusing its efforts within OPEN on this area, which is described next.

- Public Security Solution

  Public Security is the function of government which ensures the protection of citizens, communities, organizations, and institutions against threats to their well-being and to the continuity of their community. Government enhances Public Security through cross-agency or cross-industry collaboration to provide information, resources, and services to the lead agency responsible for the incident at hand.

  SAP enables a systematic, all-hazards approach enabling governments, businesses, and critical infrastructure to interact and to achieve agility in prevention and preparation, plus resilience in response and recovery to ensure security of the community and its stakeholders.

  SAP solutions for Public Security help Public Officials to manage day to day operations, properly plan and train for potential uncertainties, and effectively conduct their actions should crime or disaster strike. Public Security solutions enable efficient management of the day-to-day operations of national and/or international security organizations as well as disaster relief and emergency management efforts in connection with natural disasters, terrorist events, pandemics, or civil contingencies.

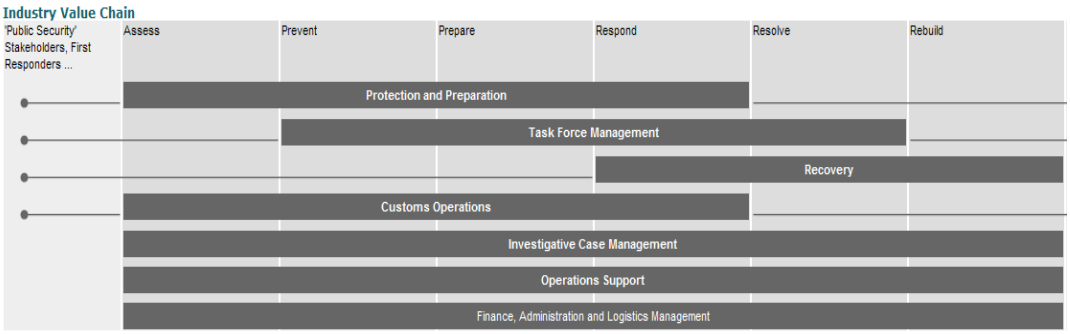

Figure 5: Public-Security Solution-Map Edition 2008

Discussions with this SAP target group have resulted in the identification of the following business/transfer opportunities as being of particular interest for SAP:

Opportunity Name	Brief Description
Multi-expert collaboration	Migration services developed in OPEN can provide the basis for a centralized cooperation scenario in which multiple experts migrate and merge their respective applications onto a large shared smart-wall, so that they can work together more effectively.

Table 5: Business / Transfer Opportunities

10.5. DESCRIPTION OF BUSINESS / TRANSFER OPPORTUNITIES

This section describes the identified opportunities in more detail.

10.5.1. OPPORTUNITY 1: MULTI-EXPERT COLLABORATION

Based on the results of the OPEN Project, SAP is investigating the feasibility of an extension to the SAP Public-Security Solution which would facilitate improved cooperation among the multiple experts needed to respond to an emergency situation. This extension would enable the experts to migrate & merge their individual applications onto a shared wall-sized device, a smart wall, and to work cooperatively at the smartwall to respond to the situation.

VALUE PROPOSITION: MULTI-EXPERT COLLABORATION

Some expected benefits of multi-expert collaboration are: first, a more comprehensive view of the situation for everyone; second, more effective cooperation of experts in responding to the situation; finally, and very importantly, saving lives, preventing injury and protecting property through more coordinated decision making.

VALUE CREATION: MULTI-EXPERT COLLABORATION

Feedback and forward loops between SAP research and the relevant IBU have been kept going to profit from each other's knowledge and experience, and to align OPEN development closely to market needs. The next step in value creation is to develop a prototype that will be validated with a small number of customers. At the same time, the ideas will be published to get feedback from a broader audience. Depending on the results of these tests, the results would be transferred to the product group for inclusion in a future version of the product.

REVENUE MODEL: MULTI-EXPERT COLLABORATION

Revenue generated by product extensions like multi-expert collaboration is not quantifiable. Therefore, it is not possible to have an independent revenue model for this opportunity.

11. EXPLOITATION PLAN FOR VODAFONE OMNITEL NV

11.1. PARTNER PROFILE OF VODAFONE OMNITEL NV

Vodafone Omnitel NV is part of the Vodafone Group, the world's leading Telecommunications Company, with a strong and growing global presence. The Group's Global footprint stretches across five continents and includes 20 Vodafone operating companies, plus more than 40 partner markets.

Vodafone Omnitel was Italy's first private mobile operator. Since the Company's foundation in 1995, it has stood out for its innovative approach to both services and communication. Today it's located throughout Italy, in 55 Offices and employs about 8,500 employees. GSM service covers about 97% of the country, while with UMTS/HSDPA [1] coverage of about 80% of the population, it offers broadband services to about 30 million customers (as of December 2008).

[Updated February 09]

11.2. BUSINESS MODEL OF VODAFONE OMNITEL NV

To better describe Vodafone's core activities, here after a quick picture of Vodafone Italia's Vision and Goals. Of course as part of a global company, Italian strategies are aligned and integrated with the ones of Vodafone Group.

1 **GSM**: GSM (Global System for Mobile communications: originally from Groupe Spécial Mobile) is the most popular standard for mobile phones in the world.

UMTS: Universal Mobile Telecommunications System (UMTS) is one of the third-generation (3G) mobile telecommunications technologies. It is specified by 3GPP and is part of the global ITU IMT-2000 standard.

HSPA: High Speed Packet Access (HSPA) is a collection of two mobile telephony protocols High Speed Downlink Packet Access (**HSDPA**) and High Speed Uplink Packet Access (**HSUPA**) that extend and improve the performance (in terms of data rate and capacity) of existing UMTS protocols. Sometimes commercially referred as "**super UMTS**".

Figure 6: Vodafone Italia's Vision, Goals and Strategic Objectives

Vodafone Italia market strategy addresses both fixed and mobile areas as highlighted in Figure 7.

Mobile broadband, leveraging on a wide mobile coverage, offers voice and data services to surf the net with "super UTMS" (HSPA) broadband speed.

The *At Home, at Office* branch brings under the same roof fixed/mobile propositions to address consumer and business needs.

- "Vodafone Station": a solution combining voice with fixed and mobile broadband services in a single device. ADSL from home and mobile broadband even when away from home with Vodafone Internet Key
- "Vodafone Rete Unica" [2]: a wide range of integrated products and services created for professionals and enterprise. The service for small, medium and large enterprises that integrates all business communication services

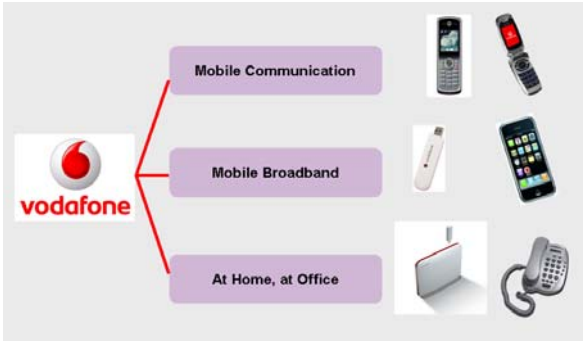

Figure 7: Vodafone Business Areas

2 **Vodafone Rete Unica**: Vodafone's commercial proposition that pack together fixed and mobile services

[Updated February 09]

11.3. EXPLOITATION STRATEGY OF VODAFONE OMNITEL NV

Within Vodafone Omnitel NV, innovation is regarded as a key asset: being part of a large group, the majority of R&D activities are managed at group level, to leverage on synergies and scale; however, competition is in many regards local, thus technology and, above all, service innovation necessarily have a strong drive by local market competition and dynamics.

Vodafone Omnitel is organized through an "Innovation campus" which is in charge of consistently elaborating an integrated service/solution design for more effective and efficient innovative product development, leveraging on the overall technology strategy evolution lines and processes, with the end goal of providing a comprehensive product view and experience to the business and technical departments.

The Innovation Campus develops around an overall process which starts from market monitoring and goes up to the knowledge transfer to the business and technical departments, passing through technical assessments, lab evaluation, proof of concepts and often pilots, as summarized in Figure 8.

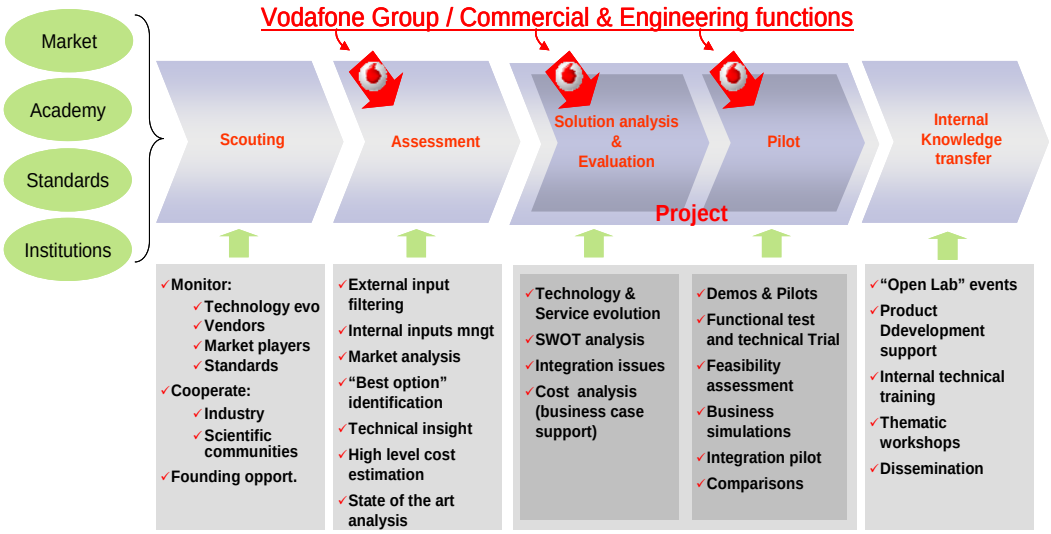

Figure 8: Vodafone Innovation Campus Process

11.3.1. THE VODAFONE OMNITEL NV RESEARCH APPROACH

By constantly monitoring technology and services evolution, collecting and elaborating signals from vendors, competitors, and academic institution joint initiatives for looking into overall market context, and collaborating with the industry and scientific communities, relevant investigation areas are selected.

Once identified, specific topics (new technologies, service platforms, applications, …) are then assessed and, where initial cost/benefit balance and SWOT analysis look promising, selected initiatives are started to evaluate technical feasibility, integration complexity and sustainability of the innovation ideas, often also through actual lab/ pilot implementation. Input in these research project phases are collected from several relevant Vodafone entities at group as well as local level, to complement technical evaluation with insight from marketing, commercial and operational viewpoints, in order to derive an overall scenario and formulate comprehensive exploitation approaches.

11.3.2. THE VODAFONE OMNITEL NV EXPLOITATION STRATEGY

Actual exploitation, in commercial terms, of the results of research activities is carried out outside the boundary of the innovation campus, by technical engineering departments jointly with commercial operations.

Within OPEN, Vodafone is focusing its effort on enhancing experience and knowledge about migratory scenarios. The specific case analyzed is an innovative gaming concept. Exploitation strategy is the transfer of knowledge into two main Innovation Campus areas: “Web 2.0 & Applications” and “Multimedia & Contents”.

11.3.3. VODAFONE OMNITEL NV VALUE CREATION

Prototypes and pilot environment built with research project initiatives are the most immediate evidence of the value created in each single project. However, experience, skills and knowledge base built along the research activities, although often immaterial and difficult to quantify, remain a valuable asset for Vodafone in general and in the innovation campus portfolio specifically, contributing to expand its background competence. Networking relationships with partners, suppliers and communities also are regarded as important byproducts of research initiatives, ready to be further exploited on future occasions.

It is also important to emphasize the relevance of the value Vodafone, through these research initiative, creates not only for its own, but also for the socio-economic ecosystem where it operates. The innovation activities are normally carried out with the involvement of third parties, i.e. often universities, startups or ‘business incubators’, whose competence finds through these initiatives a solid ground to build upon, and which benefit from exposure channels, business introductions and evaluation test beds otherwise difficult for them to match in a standalone scenario.

11.3.4. THE VODAFONE OMNITEL NV RESEARCH VALUE CHAIN

The value chain of innovation activities within Vodafone Italy is founded upon the processes described in previous paragraphs of this section.

The qualifying point in leveraging internally the value created through innovation activity carried out by the Innovation Campus resides in the successful transfer of knowledge to the more operational departments, engineering teams in the first place, but also marketing and commercial departments; in some cases, given the end-to-end scope of the innovation campus. Thus, given the activities it encompasses, the audience for the knowledge transfer activity can occasionally extend to the overall Vodafone Italy organization, including HR (training), Customer Support operations, Legal Department, Social Responsibility and External Relations.

Knowledge transfer can take several forms, spanning form special internal events, dubbed "Open Lab", where selected projects are presented with plenty of details to other departments in Vodafone not directly involved in the innovation campus work, up to direct training programs, where people from different organizations are offered a consistent induction and training on new technology/platforms/approaches or can even be included in some job rotation experience, temporarily joining an innovation campus team to work together in innovation areas soon to be moved to operational departments.

In addition, as a baseline knowledge dissemination process, thematic workshops and demo sessions are organized, and reports, assessments and regular newsletter are constantly issued and distributed to all relevant stakeholders within the company, thus implementing a sustained innovation awareness program.

11.4. IDENTIFICATION OF BUSINESS / TRANSFER OPPORTUNITIES

Migratory scenarios, where multiple devices, multiple networks and multiple users are involved, are the main area of interest for Vodafone Italia in the OPEN project.

The main players in the Telco arena, especially those with multiple assets such as fixed and mobile networks, are evolving towards innovative services that leverage on a particular asset's specificity (e.g. mobility, bandwidth, location …) but assure a seamless user experience.

Thanks to OPEN Vodafone will increase its competences in solutions (architecture, middleware, applications and user experience) able to support migratory service scenarios such as the ones provided by the convergence of fixed-mobile and telecommunication-consumer electronics, where users can migrate from an interface to another during their service usage.

Through OPEN project deliverables, Vodafone will be able to enlarge and enhance its service offering in the collaborative work and gaming services areas, which are two of the main scenarios that will become common in the future and that better represent the migratory situations that Vodafone customers will experience.

Vodafone has always been convinced of the importance of user experience for the success of its services; the focus of the OPEN project on interfaces will give Vodafone an opportunity to continue its effort to develop user experiences that are references for the telecommunications world.

In order to understand and analyze in more detail and depth the “Migration issues”, a specific scenario has been addressed in OPEN.

Rather than a well known game, a more modern and innovative game experience is being investigated, something that could possibly represent a game of the future. Migration services may represent a meaningful component of the overall game experience.

For these reasons, a time persistent game complemented with social networking and a series of elements coming from different entertainment domains have been selected.

As users form a community that play and interact for a prolonged period of time by using different media and application functionalities, migratory services enabling a continuous access across different terminals and conditions, may play a fundamental role in the overall entertainment experience.

This scenario brings together some of the main topics/trends in the ICT arena that have to be take into account by a service provider that wants to maintain market leadership.

Opportunity Name	Brief Description
Migratory scenarios	Migration scenarios analyzed and deployed in OPEN can increase Vodafone’s competence to support migratory services, enhancing Vodafone’s capability to provide enriched offerings in the collaborative and multi-network areas.

Table 6: Vodafone Business/Transfer Opportunities

11.5. DESCRIPTION OF BUSINESS / TRANSFER OPPORTUNITIES

11.5.1. OPPORTUNITY 1: MIGRATORY SCENARIOS

From the results of the OPEN project, Vodafone will/would be able to elaborate innovative concepts to put on top of basic IPTV services as currently offered by service providers.

Vodafone will/would be also able to create and manage new convergent offers bringing together concepts such as collaboration, gaming and video services, leveraging on mobile and fixed assets.

VALUE PROPOSITION : MIGRATORY SCENARIOS

Some benefits that could be expected, related to enhanced capability to manage migratory scenarios are:

- New value-added convergent services could be developed differentiating the capabilities of Vodafone's customers.
- Strong/better/enhanced user experience could be offered in multi-network environments
  - Users are in control through intuitive interaction with applications, services and devices
  - Services and applications are personalized, ambient-aware, adaptive and ubiquitous from the users point of view
  - Group of users/communities enjoy seamless service experience irrespective of their location and network connectivity.

VALUE CREATION: MIGRATORY SCENARIOS

The main project results and deliverables have been shared and feedback has been collected, inside "innovation process" meetings involving the main technology and marketing leaders. Depending on the results at the end of the project, some of the concepts/solution/products could be deployed in internal labs showing functionalities integrated with current Vodafone network functions.

REVENUE MODEL: MIGRATORY SCENARIOS

Migration scenarios are one of the main aspects of the new services that could be offered but are just one piece of the chain, therefore it is not possible to specify a revenue model.

NEED FOR SYNERGIES OR COLLABORATION WITH CONSORTIUM MEMBERS:

Currently there isn't any position on that.

NEED FOR SYNERGIES OR COLLABORATION WITH OTHER PARTIES (OUT OF THE CONSORTIUM):

Currently there isn't any position on that. Vodafone have a list of suppliers in different areas that could be involved in the future for specific topics.

OPEN SOURCING POSSIBILITY

Vodafone states that the code that has been delivered as contribution to the overall Open project has not been developed by using neither any Open Source Code nor a Licensed Code. Code delivered by Vodafone has been entirely written internally by Vodafone personnel itself.

Vodafone has not so far identified any objections to release Open project deliverable under Open Source rules but suggest discuss it in an internal Consortium meeting.

RELEVANT MARKET VIEW

This section highlights key markets trends in order to outline future market scenarios where the OPEN project's deliverables will be useful and directly applicable.

BB access

- Broadband is moving beyond the PC; it will be about connecting numerous devices, providing consumers with a range of multimedia services in an always-on digital world.
- The ability of gadgets of all sizes to connect to the Internet and download or stream content will be more prevalent in coming years.
- Connected portable devices, from netbooks to game consoles, are complementing "traditional" items such as mobile phones and desktop computers
- Mobile devices with increased power, faster communications capabilities and higher resolution displays are increasingly saturating everyday life
- Mobile phones will have more options for connecting to the mobile internet and the access will be more ubiquitous
- Wireless broadband networks mean that consumers can access broadband services within the home as well as on the move.
- Wireless technology developments are paving the way for a far more flexible broadband environment that will increasingly allow users portable and nomadic access to content, applications and services.
- The world of telecommunications is in constant flux, with fast, mobile networks enabling uninterrupted access to new internet-based products and service.
- Technical progress, increasing levels of network coverage, greater bandwidths allowing higher data speeds are factors which will expedite the progress of digitization and networking.

Multimedia Services

- Broadband internet access is popping up in TVs - new TV sets have built-in networking connections requiring no additional set-top boxes for getting online
- Usage of online video services is rising quickly and HDTV is gaining ground
- Ownership of multiple computers is becoming more common
- IPTV has the potential to transform the TV experience, not just by offering more choice and flexibility, but by integrating aspects of communications and social computing.

- The future home will be a place where consumers can watch what they want, when they want and by whichever device they want
  - The average family might have a TV in every room, and each family member might be using them for something completely different; watching one of hundreds of channels, playing video games or watching DVDs or YouTube clips.
  - IPTV expands the range of what's possible with TV. In addition to viewing video content, the TV can become a screen to view our personal digital photos or to make a video phone call. It also frees us from watching TV in the home; IPTV means we can take our content with us, wherever we go.
  - The broad range of devices available within the home shows there are many means of creating and accessing digital content.
  - To better understand how digital media is used around the home, the figure below shows results of a survey (*source: E// report "IPTV and the connected home"*) on which devices are connected to another device. The results (see Fig. below) show how devices fall into two broad categories – TV-centric devices and PC-centric devices.

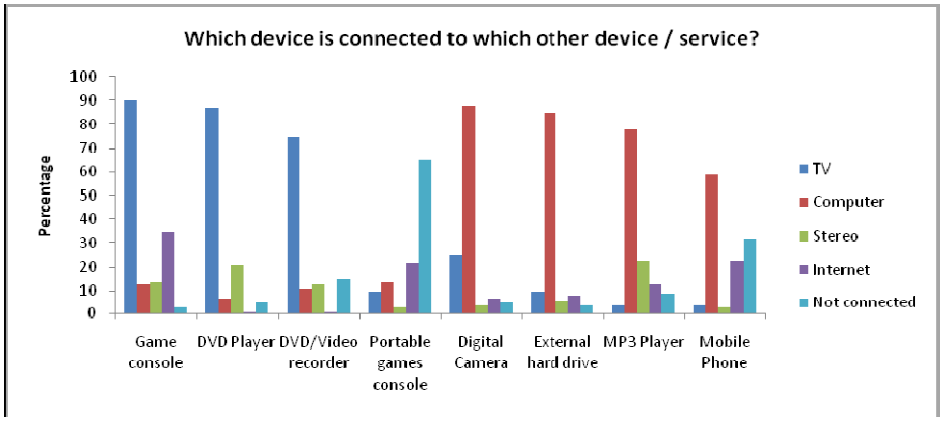

Figure 9: Survey of how devices are connected

Social Computing

- In many areas of life, digital networking is taken for granted and the importance of these technologies will continue to increase.
- Digitalization and networking ensure that anyone can stay in touch with people and things at any time
- Social media encourages the formation of a community around the game (as has been successfully demonstrated with EA's Pogo for example) and enhances the game itself.

- In 2008 nearly 2/3rds of young consumers had a social network profile (*source: Mobile Youth based on Pew IALP data 2008*)
- The growth of digitalization and networking with broader bandwidth, faster speeds and more widespread use of mobile broadband connections will further influence and shape the way we communicate

Gaming

- Cross-platform gaming is gaining momentum, e.g., solutions across interactive TV, online and mobile platform, such as role play games with several online players
- Simplicity and feature accessibility creates significant changes in consumption
- Leisure activities will be strongly influenced by digitalization and networking; it will become common to listen to music or radio over the internet, access videos at any time or fill in waiting times by playing games on mobile handsets
- Mobile game revenues potentially have long term value as an advertising rather than direct revenue generation tool
- "Advergaming" passed $1billion in 2007 and will double in value by 2011 (*source: Mobile Youth 2008 based on emarketer data*)
- In game advertising offers a useful option in developing a wider community strategy
- The community is often seen as a very important part of the game, particularly in the case of multi-player games.
- In the Massively Multi-Player Online Game (MMOG) industry there is a saying "they come for the game but they stay for the community"
- Plenty of literature exists describing the benefits of a game having an active player community (*source Nokia report: "Mobile games 2010"*)
- Connected (online) mobile games will gain momentum with increasing network capabilities in terms of latency and throughput
- Some technologies that will become more common in mobile games such as the mobile phone camera, will encourage the development of games with new interaction styles

- Technology enhancement will drive flexible game interaction functionality such as the use of voice chat simultaneously with game playing, presence[3] and messaging
- Technological advancements in the mobile phone such as hardware accelerated 3D graphics will drive the increasing quality of the mobile games

These trends will generate opportunities in the ICT arena to create new services. Vodafone, leveraging on fixed and mobile assets, needs to keep pace with these trends.

In this complex environment better knowledge of migration scenarios will be a key topic, which is necessary to continue to offer customers better experience.

RESULTING SWOT ANALYSIS

-

Strengths	Weakness
- Vodafone offers fixed and mobile services with a strong brand recognition - Broadband, mobility, user experience are key topics in Vodafone propositions - OPEN project deliverables have the potential to enrich Vodafone proposals	- New service propositions in multi-environment scenarios might require new business model analysis and adoption. - Vodafone might have to rethink some business models or change some consolidated ones to better address these new types of concepts
Opportunities	**Threats**
- Better user experience in complex services scenarios - Innovative services could be better managed and implemented - Diversify the range of services in order to gain incremental revenue and increase customer loyalty.	- Increase network complexity - Bandwidth hungry services could stress network planning process and add technical constraints

Table 7: Vodafone SWOT Analysis

3 **Presence**: In computer and telecommunications networks, presence information is a status indicator that conveys ability and willingness of a potential communication partner. Presence information has wide application in many communication services and is one of the innovations driving the popularity of instant messaging or implementations of voice over IP clients.

DETAILS OF ANY RELATED IPR

Vodafone has not decided yet if to protect the code it has delivered as contribution within Open project.

Vodafone has not used any owned or third party patent in such code development neither identified so far any specific idea to protect.

Should Vodafone finally go for the protection of its own intellectual property related to tasks performed in this project, it shall act according to what jointly agreed in the CA.

12. ACRONYMS

AAL Ambient Assisted Living

ACM Association for Computing Machinery

ALR Application Logic Reconfiguration

BB Broadband

CMF Context Management Framework

CHI Computer Human Interaction

EICS Engineering Interactive Computing Systems

FIS Future Internet Symposium

GSM Global System for Mobile communications

HCI Human Computer Interaction

HDTV High Definition Television

HPC High Performance Computing

HSDPA High Speed Downlink Packet Access

HSPA High Speed Packet Access

HSUPA High Speed Uplink Packet Access

IPTV Internet Protocol Television

IUI Intelligent User Interfaces

MSP Migration Service Platform

PDA Personal Digital Assistant

SWOT Strengths, Weaknesses, Opportunities, Threats

TPI Task Programming Interface

UI User Interface

UMTS Universal Mobile Telecommunications System

13. BIBLIOGRAPHY

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[Rhem98] James Rhem, Problem Based Learning: An introduction, The national Teaching and Learning Forum, Volume 8, Number 1, 1998, see http://www.ntlf.com.

14. PROJECT DISSEMINATION

Date & Location	Event	Activity	Presented / Prepared by	Audience Type	Countries addressed	Partner responsible / Involved	Documentation (URL & / or available material
Project Year 1: February 2008 to January 2009							
05 March 2008 :: Brussels, Belgium	Software & Services FP7 Projects towards the Internet of Services	Presentation: OPEN Project			EU		http://cordis.europa.eu/fp7/ict/ssai/fp7-launch-march08-reg_en.html
5-7 May 2008:: Innsbruck, Austria	Business Information Systems 11th International Conference, BIS 2008	Paper Presentation: From Business Rules to Application Rules in Rich Internet Applications. BIS 2008: 447-458	Kay-Uwe Schmidt, Ljiljana Stojanovic	Scientific		SAP	http://www.springerlink.com/content/vpl18g56262lw551/
1 - 5 June 2008:: Tenerife (Spain)	ESWC (European Semantic Web Conference 2008: 736-750	Paper Presentation: User Interface Adaptation Architecture for Rich Internet Applications.	Kay-Uwe Schmidt, Jörg Dörflinger, Tirdad Rahmani, Mehdi Sahbi, Ljiljana Stojanovic, Susan Marie Thomas	Scientific		SAP	http://www.springerlink.com/content/b1n610m100p65878/
24 June 2008:: Madrid, Spain	1st international workshop on Service Front End Technologies in the future of Internet of Services	Presentation: OPEN Project		EU FP7 FAST project, User-Services Interaction (USI) NESSI Working Group	EU		http://cordis.europa.eu/fp7/ict/ssai/projects_en.html#open

31 August - 5th September 2008 :: Turin (Italy)	7th international EGOV conference 2008	Paper Presentation: Using Semantic Web Usage Mining to Improve E-Government Websites EGOV'08	Tirdad Rahmani, Susan Marie Thomas, Kay-Uwe Schmidt and Ljiljana Stojanovic	Scientific	European	SAP	http://www.egov-conference.org/egov-2008/final_program_f/myfile
22 Sept 2008:: Brussels, Belgium	Service Front Ends	Presentation: OPEN Project			EU	ISTI-CNR	http://cordis.europa.eu/fp7/ict/ssai/events-20080922-23-cm-soft-ag_en.html
28 - 30 Sept 2008 :: Vienna, Austria	Future Internet Symposium 2008	Poster Presentation:	ISTI-CNR and AAU		EU	ISTI-CNR	http://www.fis2008.org/
Info not found	W3C Workshop	Discussions: The Future of Social Networking	NLE-NW	Internet/WWW Audience	EU		-
September 2008 :: Pisa, Italy	Tamodia /HCSE 2008	Demonstration Paper: describing the CNR-ISTI environment for supporting user interface migration through different devices, including mobile ones and digital TV	ISTI-CNR	Human-Centred Software Engineering Audience	EU	ISTI-CNR	http://www.informatik.uni-trier.de/~ley/db/conf/tamodia/tamodia2008.html
Info not found	NEXOF kick-off meeting: Service Discovery Investigation	Presentation: OPEN Project	Clausthal	Architecture audience	EU	Clausthal	http://www.nexof-ra.eu/
22 - 23 Sept 2008 ::	Internet of Services Collaboration Meeting for FP6 & FP7 projects	Prototype Presentation: Application logic reconfiguration.	Clausthal	Internet/WWW Audience	EU	Clausthal	http://cordis.europa.eu/fp7/ict/ssai/events-20080922-23-cm-soft_en.html
23 October 2008 :: Mandelieu la Napoule (France)	W3C Meeting	Poster Presentation & starting of a new group on Model-based User Interface Design	ISTI-CNR	Internet/WWW Audience	EU	ISTI-CNR	http://www.w3.org/2008/10/TPAC/

26-30 October 2008 :: KongressZentrum, Karlsruhe, Germany	International Semantic Web Conference	Poster Presentation: Taking Enterprise Search to the Next Level	Kay-Uwe Schmidt, Daniel Oberle, Klaus Deissner	Scientific		SAP	-
25 - 27 Nov 2008:: Lyon France	ICT Conference	Presentation: OPEN Project	ISTI-CNR	ICT Community (Networking)	EU	ISTI-CNR	-
10-13 Dec 2008:: Madrid, Spain	Service Wave 2008 - Workshop on Service Front Ends	Presentation: OPEN Project	ISTI-CNR	Distributed Software Development Audience	EU	ISTI-CNR	http://www.nessi-europe.eu/Nessi/Portals/0/FServiceWave_2008_Programme.pdf
Project Year 2: February 2009 to January 2010							
22 - 24 April 2009 :: Aalborg, Denmark	Forskningens Døgn (A Day of Research)	3 lectures presenting OPEN Project and related research	AAU	Non-technical audience	Denmark, Danish lecture	AAU	-
5 May, 2009 :: Aalborg, Denmark	Media on the Move	1 invited talk about OPEN project and concept	AAU	Internet/WWW Audience	Denmark, Danish	AAU	http://www.mediaonmove.com/NR/rdonlyres/826E17C3-203B-4D0D-AE38-49CED59029EE/0/RasmusLMediaOnTheMove.pdf
4 March 2009 :: Aalborg, Denmark	Open house	Show of OPEN demo for a full day for attracting potential students from high school to the engineering education	AAU	Potential students from High school	Denmark, Danish	AAU	-
2 - 4 March 2009 :: Siegen, Germany	EUD 2009 Conference	Presentation: Cicero Designer: an Environment for End-User Development of Multi-Device Museum Guides	Giuseppe Ghiani	Software Engineering / HCI	EU	ISTI-CNR	http://www.eud2009.uni-siegen.de/

13 - 14 May 2009 :: Prague, Czech Republic	Future Internet Assembly + SFE Alliance Meeting	Presentation: OPEN Project	Fabio Paternò	European organizations	EU	ISTI-CNR	http://www.fi-prague.eu/
9 - 13 June 2009 :: Bruxelles, Belgium	EU Collaboration Meeting	Presentation: OPEN Project	Carmen Santoro	European Projects	EU	ISTI-CNR	http://ec.europa.eu/information_society/events/ssai/ios/working_groups/index_en.htm
19 - 21 June, 2009 :: Clausthal-Zellerfeld, Germany	Informatics days	Presentation of the middleware	Holger Klus	Students/ Scholars		CIU	http://www.tu-clausthal.de/presse/nachrichten/details.php?id=781
16 - 17 May 2009 :: Vancouver, Canada	ICSP 2009	Presentation of the middleware	Dirk Niebuhr	Researcher		CIU	http://www.in.tu-clausthal.de/abteilungen/software-systems-engineering/publikationen/?tx_ssebibtexdb_pi1[showUid]=176&cHash=88a122742b
16 - 17 May 2009 :: Vancouver, Canada	ICSP 2009	Paper submission	Dirk Niebuhr	Researcher		CIU	http://www.in.tu-clausthal.de/abteilungen/software-systems-engineering/publikationen/?tx_ssebibtexdb_pi1[showUid]=177&cHash=fe284fa197
3 - 8 March 2009 :: Hannover, Germany	CeBIT	Presentation: Middleware presentation	Holger Klus	Mess presentation		CIU	http://www.cebit.de/homepage_d

24Apr, 13July, 22July, 23July, 25July :: Karlsruhe, Walldorf	SAP Product Group Meeting	Organization of ongoing meetings with internal product groups to bring migratory user interfaces to the SAP core groups. Final goal is to setup one or more transfer projects to present OPEN research results to SAP customers	Axel Spriestersbach, Kay-Uwe Schmidt	Solution Mangers	World Wide	POA Suite Foundation	-
Ongoing :: Karlsruhe, Walldorf	Product Design	Establishment of a link with SAP's public sector group for promoting the emergency prototype	Axel Spriestersbach, Kay-Uwe Schmidt	Solution Mangers	Germany	IBU Public Security	
24 April 2009 ::	Vodafone Marketing Meeting	Presentation: OPEN Project	Agnese Grasselli, Stefano Marzorati	Vodafone Marketing and Strategy Managers	Italy	Vodafone	
21 May 2009 ::	Vodafone Network Engineering staff meeting	Presentation: OPEN Project	Agnese Grasselli, Mirco Zublena	Vodafone Network Managers	Italy	Vodafone	
9 June 2009 ::	Post in NoiLab (Vodafone internal blog)	Description of the OPEN project, usability testing activities & the available prototypes (Ongoing)	Agnese Grasselli	Vodafone employees	Italy	Vodafone	